

Chapter 36 – Ames Ergonomics Program (REDACTED)

36.1. Purpose

This manual is applicable to: (1) all Ames Employees; and (2) all persons and entities who agree in writing to comply with this manual.

36.2. Policy

The goal of the Ames Ergonomics Program is to use sound ergonomic principles to reduce the number and severity of MSDs caused by exposure to risk factors in the workplace. Statistics have shown that MSDs are the fastest growing category of occupational illness in the United States and are increasing Worker's Compensation costs significantly. MSDs are health disorders arising from repeated biomechanical stress due to ergonomic hazards.

36.3. Applicability

The Ames Ergonomics Program described in this chapter is applicable to all Ames Research Center employees, to all work conducted under the authority of Ames, and to all equipment and property managed by Ames. For Ames contractors, it is applicable in accordance with the terms of their contracts.

36.4. Responsibilities

36.4.1. Ames Health Unit/Medical Management

1. Ames civil servants must be evaluated by an Ames Health Unit physician if they are experiencing pain or discomfort that is related to the work environment.
2. The Ames Health Unit physician will determine the appropriate medical treatment.
3. The Ames Health Unit will request a workstation evaluation from the Safety and Health Division if appropriate.
4. Civil Service employees will be instructed in Worker's Compensation procedures if a claim needs to be filed.
5. The Ames Health Unit will follow-up and manage individual employee cases.
6. Contractors may also request ergonomic evaluations from the Safety and Health Division if deemed necessary by their own physicians.

36.4.2. Safety, Health and Medical Services Division

1. Evaluate individual workstations, as requested by management, the Ames Health Unit, and individual employees to determine ergonomic hazards.
2. Provide training and information about ergonomic issues to increase awareness of employees, supervisors, and managers.
3. Maintain records of workstation evaluations and ergonomics log.
4. Provide consultation on selection of furniture and equipment.
5. Assist supervisors, if necessary, in managing ergonomic concerns.
6. Evaluate program and its effectiveness periodically.

36.4.3. Supervisors

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36.4.4. Employees

Civil service and contractor employees must take responsibility for their own health and safety.

1. Attend ergonomics training; learn the signs and symptoms of MSDs.
2. Report persistent discomfort or pain associated with your job to your supervisor and the Ames Health Unit (civil servants).
3. Seek medical attention early.
4. Practice good posture and work habits to reduce ergonomic injury.
5. Discuss your ergonomic concerns with your supervisor.
6. Use ergonomic PPE when required by a physician or your supervisor.

36.5. Training and Education

1. Office Ergonomics classes are offered regularly through the Safety Division. Employees can sign up electronically on the QH website, or by calling REDACTED. Special presentations and demonstrations may be scheduled upon request.
2. It is strongly recommended that employees take the Office Ergonomics class before requesting a workstation evaluation. This class should be repeated every three years.
3. The main goals of employee information and training are the following:
 - a. Recognition of the signs and symptoms related to MSDs and the importance of early reporting.
 - b. Awareness of MSD risk factors.
 - c. Awareness of safe work methods.
 - d. Awareness of Ames' methods to reduce MSDs.
 - e. Instruction on how to purchase ergonomic furniture and accessories.
4. Chair Exercise Classes are taught periodically at the Ames Fitness Center. These classes teach employees how to do simple stretches at their desks that can help reduce MSDs. Check the Fitness Center calendar for current schedule.

36.6. Workstation Evaluations

36.6.1. Ames Health Unit Evaluations

1. When an employee is seen at the Ames Health Unit for a possible work-related injury, a "Request for Ergonomic Evaluation" form is sent to the Ergonomics Program Manager.
2. The Ergonomics Program Manager will contact the employee to schedule a workstation evaluation.
3. A report will be completed by the Ergonomics Program Manager and sent to the employee's supervisor, the employee, and the Ames Health Unit.

36.6.2. Preventive/Requested by Individual

1. Civil service employees may request ergonomic evaluations of their work environments or job tasks by contacting the Safety, Health and Medical Services Division or the Ergonomics Program Manager.
2. Contractor employees should check with their site managers to see if any other means of evaluation exists, such as through their occupational health clinics, or benefits office. If no

other means of evaluation is available, Safety Office staff or Ergonomics Team member can assist.

36.7. Engineering Controls for Computer Workstations

The following engineering controls are recommended for employees who work two consecutive hours on the computer, or a total of four hours or more on the computer per day.

36.7.1. Chairs

Chairs should have an adjustable back that will provide adequate support for the lumbar spine and trunk. A back that adjusts separately from the seat pan is optimal. Chairs should easily adjust in height to permit the feet to rest flat on the floor. A footrest may be needed by some to achieve this position. Chairs should have a five-star base and casters compatible with the floor surface. If the chair has armrests, they should adjust up and down, in and out and not obstruct the typing position. The seat pan should adjust in length and have a forward-tilt option, allowing a dropped knee position of 128 degrees or greater, thus relieving compression of the lumbar vertebrae. Chairs should have a waterfall (curved) front to prevent pinching of the sciatic nerve.

36.7.2. Work Surfaces

Work surfaces should be large enough to accommodate all computer equipment, including a wrist rest in front of the keyboard and document holder. A keyboard tray can be used to increase depth and allow for proper positioning of the keyboard, just above the lap. There should also be enough room under the work surface to allow free leg movement. The height of the work surface should allow the forearms to be parallel with the floor (arms at 90 degrees or slightly greater) while working at the keyboard.

36.7.3. Keyboard/Input Device

The keyboard and input device (mouse or trackball) should be at the same level as the keyboard and directly in front of, or in line with, the operator. The height of the keyboard and input device should allow operators to position their forearms and hands parallel to the floor. This can be achieved by adjusting the height of the chair and/or table, or by using an adjustable keyboard tray. A wrist rest for the keyboard and input device can be used to prevent wrists from coming in contact with hard surfaces or sharp edges when the arms are at rest.

36.7.4. Monitor

The monitor (screen) should be centered directly in front of the operator and the top of the screen should be at eye level, or slightly lower. People who wear bifocals may need to lower their monitors to avoid neck strain. Monitors should be approximately an arm length away, but may vary with individual vision.

36.7.5. Vision

Although often overlooked, vision is a critical part of the workstation design. An annual eye examination is recommended to ensure that any changes in vision are detected and corrected. Operators should periodically look away from the computer to a distant object to relax the eye muscles. The Ames Health Unit provides single-vision computer glasses for employees who work at computers for more than two consecutive hours, or for more than four hours a day. (See Section 36.11 below, Computer Glasses program.)

36.7.6. Lighting

The monitor should be positioned in a location where window light does not reflect off the screen. Blinds, drapes, or glare screens may be used to reduce glare. Light bulbs can be removed from light fixtures to reduce brightness.

36.7.7. Document Holder

A variety of document holders are available for those who work off hard copy documents. Documents should be at the same level as the monitor, or positioned in between the monitor and keyboard to reduce neck strain.

36.8. Administrative Controls

Administrative controls are changes in the way work is assigned or scheduled that reduce the magnitude, frequency or duration of the exposure to ergonomic risk factors. Examples of administrative controls include:

1. Taking breaks. Employees working long hours at the computer should avoid static, awkward positions and take 2-minute stretch breaks at least every hour. Doing simple stretches increases circulation and speeds recovery.
2. Rotating job tasks. Avoid static postures or minimize exposure time to a specific task.

36.9. Recordkeeping

Records of workstation evaluations are maintained in the Safety, Health and Medical Services Division and the Ames Health Unit. The Ames Health Unit maintains employees' medical records, which are confidential.

The following records will be maintained:

1. Request for Ergonomic Evaluation from the Health Unit
2. Ergonomics Log of all evaluations performed
3. Job and workstation evaluations
4. Supervisors' response to recommended control measures
5. Evaluation of the Ergonomics Program and its effectiveness
6. Minutes and evaluations of Ergonomics Solutions Team

36.10. Identifying Potential Ergonomic Problems

Many ergonomic disorders originally manifest as strains and sprains. Acute or chronic muscle strain can be an indication that the capacity of the body to accommodate stress has been exceeded. Acute muscle strain occurs when a concentrated episode has overstressed the musculoskeletal system. Chronic strains result from less intense stresses that accumulate over a period of time, thus reducing the rate of recovery. Table 1 describes some MSD disorders and their symptoms.

Table 1. Common Musculoskeletal Disorders	
Injury	Symptoms
Carpal Tunnel Syndrome	Caused by compression of the median nerve, which runs through the center of the wrist. Early symptoms include numbness, tingling and burning sensations in the thumb, index and middle finger. An aching sensation and wrist pain (often at night) are also common.
Tendonitis	The tendons of the hands and wrists can become inflamed from overstretching or constriction. Symptoms include pain, tenderness, swelling, and weakness of the hand, arm or shoulder, and even redness of the hand or wrist.
Tenosynovitis	An inflammation of the tendon and the sheath that covers it. Symptoms include swelling, tenderness, and pain in the hand or arm.
Epicondylitis	Also known as tennis elbow. This condition can occur laterally or medially and is due to inflammation of the tendons in the elbow. Symptoms include pain with some swelling and weakness.

Injury	Symptoms
Trigger finger	This condition results when the tendon sheath is sufficiently swollen, causing the tendon to lock in the sheath. A snapping and jerking movement occurs when attempting to move the finger.
Rotator cuff injury	Occurs when one or more of the four rotator cuff tendons in the shoulder is inflamed. Symptoms include pain and limited movement of the shoulder.
DeQuervain's Disease	The progressive constriction of the tendon sheath. This disease affects the tendons on the side of the wrist and at the base of the thumb. Symptoms include pain and difficulty in movement.
White Finger	Also known as vibration syndrome or Raynaud's Phenomenon. The disorder occurs when blood vessels in the fingers are damaged, especially due to the use of vibrating tools in cold weather. Symptoms include paleness in the fingers, tingling, and a sense that the finger is "on fire."

36.11. Computer Glasses Program

Computer glasses correct for mid-range vision and may be helpful for employees working two consecutive hours or at least 4 hours per day on a computer. They are provided for civil servants and contractors at the expense of the organization and to contractors at their own cost. A current prescription (within the last year) is required. An optometrist is onsite at the Ames Health Unit one day a week to see patients.

36.11.1. Civil Servants

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36.11.2. Contractors

1. Computer glasses are provided to contractors at their own expense. Procedures are the same as above, but the glasses are charged at a set fee of \$120 a pair.
2. They can be purchased with personal credit cards and be reimbursed by the contract.

36.12. Ergonomics Demo Room

1. The Ergonomics Demo Room is located in REDACTED. Items available through Stores Stock are labeled and on display for employees to try out. Several Unicolor and GSA chairs are available for demo. Many other computer accessories are on display, with information on how to purchase. Items cannot be borrowed.
2. The room is open during regular working hours. The Ergonomics Program Manager can assist with questions if available. It is preferable to call for an appointment.

36.13. Ergonomics Solutions Team

The Ergonomics Solutions Team is a safety committee made up of approximately 30 volunteers representing every Directorate at Ames. These employees are trained to perform preventive ergonomic evaluations in their codes, with the goal of helping to reduce ergonomic hazards in the workplace and RSIs at the Center. The team meets bi-monthly.

36.14. Furniture Purchases

36.14.1. Unicolor (Federal Prison Industries, Inc.)

1. Unicolor is the mandatory source for furniture purchases for government employees. However if delivery of the chair is needed within 10 days, a GSA vendor may be used. If furniture other than Unicolor is needed, Unicolor must grant a waiver. This may be done online at the following website: <http://www.unicor.gov/customer/waiverform/htm>

2. For the waiver, a justification must be written specifying what features the furniture you want has that the Unicorn cannot provide. The waiver request form is submitted electronically and Unicorn
3. All chairs can be purchased on government bankcards. If a waiver has been obtained, it must be attached to the monthly SoA that is submitted to Accounting. Contractors cannot order furniture on their contracts unless specifically stated in their contract. Civil servants can order chairs for contractors if not allowed on their contracts.

36.14.2. Stores Stock Items

1. All Stores Stock ergonomic items can be found on the QH website at: <http://qh.arc.nasa.gov>. Click on Health, then Ergonomics.
2. To order ergonomic items, fill out an ARC 45 & submit to Stores Stock, REDACTED.

36.15. Appendices

36.15.1. Appendix A: Office Ergonomics Evaluation Worksheet

Employee's Name/Ext/MS:	
Worksite/Location:	
Supervisor:	
Code/MS:	
Evaluated By:	
Date:	
Total No. of Workstations Represented:	
Type of VDT Equipment Used:	
Type of Tasks Performed:	
Typical Hours and Work Conditions of VDT Operations:	

WORKSTATION EQUIPMENT		
Do the chair, work surface and VDT fit the operator or readily adjust, such that the operator can have the following elements of proper posture:		
	Yes	No
1. Are the keyboard and other input devices at approximately elbow height?		
2. Is the primary screen display below eye level with the primary viewing area from 1 to 60 degrees below the horizontal plane at eye level?		
3. Is there adequate space beneath the work surface for the employee's legs?		

	Yes	No
4. Is the front edge of the keyboard, other input devices and/or their support surface (wherever palm, wrist or forearm contact occurs) rounded and/or padded?		
5. Is the work surface of sufficient size to accommodate the VDT components, document holder and other task-dependent items?		
6. Is there adequate space and comfortable support for the employee's knees and hips to be bent at approximately 90 degrees or greater with arms at their sides and wrists straight at the keyboard/ input device?		
7. Is the screen display equipped or positioned to minimize glare?		
8. Do the employees have frequent short interruptions from keystroke/inputting at regular intervals throughout the shift during which they can perform other duties, or otherwise give their hands and wrists a break?		
RECOGNITION AND TRAINING		
Are employees trained and aware of the following information?		
	Yes	No
9. VDT equipment and/or work practices that caused repetitive motion injuries.		
10. Symptoms of repetitive motion injuries associated with VDT use.		
11. The importance of reporting symptoms and injuries to the supervisor.		
12. The importance of employees taking frequent short interruptions from keystroke/inputting at regular intervals throughout the shift during which they can perform other duties, or otherwise give their hands and wrists a break.		
13. The importance of the employee maintaining proper posture and proper adjustment of the workstation to minimize repetitive motion injuries.		
14. Methods used by NASA to minimize ergonomic injuries.		
TRAINING OF VDT OPERATORS		
A training program shall be provided to all employees determined by the workstation evaluation to be at risk for the same type of repetitive motion injuries that triggered the evaluation (i.e., by an answer of "No" to any of the 14 worksheet questions). The training program shall address the information provided in questions 9 through 14 of the evaluation in sufficient detail that any previous "No" answers to questions 9 to 14 are changed to "Yes."		
Employee Comments		

Notes

If a problem exists, was the supervisor contacted? Yes _____ No _____

If yes, when? _____

Need for further information or evaluation?

Yes _____ No _____ Not at this time _____

Recommendations

Evaluator's Signature: _____ Date: _____

Ext.: _____

36.15.2. Appendix B: Ergonomic Evaluation/Supervisor Responsibility

Dates:

TO:

FROM: Ergonomic Evaluator, Code QH

SUBJECT: Ergonomic Evaluation/Supervisor Responsibility

Your employee, _____, was evaluated by _____, on _____. Please see attached evaluation form and recommendations for suggested changes to the employee's workstation to help minimize present and future repetitive motion injuries.

As the supervisor for this operation, please review these findings and recommendations. Any workstation identified during the evaluation as posing an ergonomic risk (i.e., by an answer "No" to any of the first eight (8) work sheet questions) needs to be corrected by using any combination of feasible engineering and/or administrative controls to change any "No" answer to "Yes."

1. Have modifications been made regarding each recommendation of the evaluator?
_____ YES _____ NO
2. If certain areas have not been addressed, please state the reason(s) below:
3. Additional comments:

If you have any questions regarding this ergonomic evaluation, please call me at [REDACTED]. Thank you for your assistance.

Please answer the above questions and return this form to REDACTED within thirty (30) days from the date of this memorandum.

REDACTED, M.P.H. _____

CC: **REDACTED**, M.D.

36.15.3. Appendix C: Hand Tool Ergonomics

Below are some key points to remember when selecting, purchasing or using hand tools. Following these points can help prevent MSDs and related injuries:

- Avoid tools that produce a bent wrist position during use. The ideal wrist position is neutral (i.e., straight). This position should be maintained while performing work. Following good ergonomic design principles allows you to keep your wrists straight and your elbows close to the body. Job tasks that require excessive twisting or bending may place great strain on the nerves, tendons and muscles in your arm.
- Handles should be located close to the center of gravity of the tool. This reduces the chance of a tool slipping out of your hand. For most tools, choose a handle length of at least five inches -add another half-inch if you wear gloves. A short handle won't allow all of your fingers to grip the handle and, as a result, it may dig into your palm, pressing on nerves and reducing blood flow. Textured plastic or rubber grips provide friction for a more secure grip. Padded grips reduce the impact of vibration. Avoid metal handles since they can conduct electricity. Handle grips with form-fitting finger grooves should be avoided. These grips seldom fit the user's hands and fingers, causing additional stress to the fingers.
- Select hand tools that fit the workers' hands. A tool that is too large or too small produces stresses in the hand and wrist. As a general rule, the ideal handle diameter is 1.5 in. for a man and 1.3 in. for a woman.
- Do not select a tool so large as to be difficult to hold. Heavy or unbalanced tools tire the upper arm and shoulder muscles, especially when the job task requires you to straighten your arm out. The amount of weight you can handle comfortably will vary from person to person.
- Select power or pneumatic tools with built-in vibration dampening. Use a soft covering on a tool handle to protect the hands from heat and cold and to help reduce pressure points, vibration, and slipperiness of the grip. Such covering encourages a more relaxed hold on the tool.
- For tools that are activated by a trigger, choose a grip size that allows activation with the middle part of the fingers. Activation with the fingertips can create nodules on nerve sheaths and cause a type of cumulative trauma disorder (CTD), known as trigger finger.

The following are additional considerations during the use of hand tools to help avoid ergonomic related injuries:

Grip Force

This is the force required to hold and operate a tool. There are two basic hand grips-power and pinch. Power grips are best when you need to exert high forces. Pinch grips are better suited to precision tasks. Excessive grip force can harm soft tissues and nerves, tendons and blood vessels. Therefore, grips should distribute force over as wide an area as possible, with little or no pressure on the sides of the fingers.

Feed Force

This is the force used to operate a tool. Pushing, pulling or twisting are all examples of feed force. The more comfortable the grip, the better, as the feed force is spread out in your palm.

Repetitions

Repetitions are the number of tool cycles required to perform the job task. Highly repetitive tasks, combined with excessive twisting and bending of the wrists, arms or shoulders can inflame the tendons.

Vibration

The shock waves transmitted to your hands and shoulders are examples of vibration. Normally, vibration does not cause CTDs. However, vibration combined with an awkward posture, force and repetition can speed the time in which you develop a CTD. Frequencies of 40-90 hertz produce the greatest stress. Lower-frequency vibrations can also be damaging if you repeat the job task frequently. You can reduce vibration stress by wearing vibration-damping gloves, lowering power-tool speeds, and breaking down lengthy projects into shorter-duration tasks, and balancing out-of-round rotating parts.

Torque

Torque is the force that produces rotation or "torsion." When you drive a fastener into material with a power tool, torque transfers to your hand when the screw or bolt bottoms out and makes your hand snap. Repetitive snapping motions can produce a great deal of stress and can cause injuries and illnesses when they occur on a regular basis. Power tools with an extra handle for your other hand help counter torque stress. Pulse tools, which stop rotating when the desired torque is reached, can also help reduce torque stress.

36.15.4. Appendix D: Manual Materials Handling

In addition to computer workstations, there are many other work settings where ergonomic practices are important in order to prevent Musculoskeletal Disorders (MSDs) and Cumulative Trauma Disorders (CTDs). The following table provides a list of the most common risk factors associated with these types of injuries and the recommended control measures.

RISK FACTOR	CONTROL MEASURES
Weight of object	<ul style="list-style-type: none"> • Use mechanical assist • Get help-use two person lift • Split load into smaller/lighter loads • Increase container size and use mechanical lifting device
Horizontal distance of load from body	<ul style="list-style-type: none"> • Lift load close to body • Use mechanical assist • Store heavy items within easy reach • Repackage load before lifting • Workstation design-heavy items located within easy reach
Vertical location of load	<ul style="list-style-type: none"> • Avoid lifts above shoulder height • Avoid lifts near floor level • Store heavy items at or near waist level • Store frequently handled items at or near waist level
Frequent handling of loads for long periods	<ul style="list-style-type: none"> • Use conveyor systems • Increase number of workers doing job • Reorganize work methods • Cross train employees to perform several jobs
Twisting/awkward postures	<ul style="list-style-type: none"> • Workplace design to minimize twisting while lifting • Use of conveyors, lift tables and other mechanical assist devices • Eliminate clutter in workspace

Ergonomic considerations are present with every job and task performed by an individual. Determining the most effective and practical control measures requires a comprehensive evaluation of the job, the risk factors, and worker-specific criteria. These evaluations should be requested through your supervisor, or by contacting Safety, Health and Medical Services Division as indicated in this chapter. The following are basic measures that can be taken to minimize the potential for ergonomic related injuries:

- Respect pain. If an activity causes pain or discomfort, stop and evaluate the activity to look for alternative approaches. Change positions if the activity is causing pain or discomfort.
- Alternate tasks during the workday to interrupt repetitive activities.
- Keep the wrists in the neutral position whenever possible.
- Use two hands whenever possible, even when handling light objects or doing small tasks.
- Make several trips with lighter loads. Use a cart or dolly, if necessary.
- To avoid the use of a sustained, forceful grip, use a vice, clamp, or jig to stabilize objects.

END OF DOCUMENT